

IN THE CLAIMS:

The following is a complete listing of the claims in this application, reflects all changes currently being made to the claims, and replaces all earlier versions and all earlier listings of the claims:

1. (Previously presented): An image pickup device comprising:
- a color filter array that includes color filters arranged in horizontal and vertical directions;
 - and an image pickup element for picking up an image of an object through said color filter array, wherein
 - said color filter array comprises color filter groups of a plurality of units, in which each unit comprises first to eighth color filter groups and each color filter group represents a column comprises an array of the color filters,
 - the first color filter group comprises an alternate array of first and second color filters,
 - the second color filter group comprises an alternate array of third and fourth color filters,
 - the third color filter group comprises an alternate array of the second and first color filters,
 - the fourth color filter group comprises an alternate array of the fourth and third color filters,
 - the fifth color filter group is arranged in a same manner as the third color filter group,
 - the sixth color filter group is arranged in a same manner as the second color filter group,

the seventh color filter group is arranged in a same manner as the first color filter group, and

the eighth color filter group is arranged in a same manner as the fourth color filter group.

2. (Previously presented): An image pickup device according to claim 1, wherein the first to fourth color filters are of yellow, cyan, magenta and green.

3. (Currently amended): An image pickup device comprising:
a color filter array comprising color filters arranged in horizontal and vertical directions;

a plurality of pixels including photoelectric converting elements arranged in the horizontal and vertical directions, respectively corresponding to the color filters;

a plurality of vertical read-out units provided for a plurality of pixels arranged in the vertical direction, said plurality of vertical read-out units being arranged to read out signals from the plurality of pixels arranged in the vertical direction;

a horizontal read-out unit arranged to read out sequentially the signals from said plurality of vertical read-out units in the horizontal direction;


an output unit arranged to output sequentially the signals from said horizontal read-out unit; and

a control unit arranged to divide the plurality of pixels on a unit basis of a predetermined number of lines, which includes a plurality of first lines alternating with a plurality of second lines, and arranged to add the signals of pixels of adjacent first lines and second lines to generate a color difference signal from every unit,

wherein said control unit generates sequentially different color difference signals from the units adjacent to each other so that the color difference signals generated from adjacent units are different, and the color difference signals generated from every other unit are equal.

4. (Previously presented): An image pickup device comprising an image pickup element for picking up an image of an object, said image pickup device comprising:

a color filter array that includes color filters arranged in horizontal and vertical directions, through which an image of an object is picked up by the image pickup element;

 a plurality of pixels constituting photoelectric converting elements arranged in the horizontal and vertical directions, respectively corresponding to the color filters;

a plurality of vertical charge transfer units provided respectively corresponding to columns of the plurality of pixels in the vertical direction, for transferring electric charges from the plurality of pixels in the vertical direction;

a horizontal charge transfer unit connected to ends of said plurality of vertical charge transfer units, for transferring the electric charges, transferred from said plurality of vertical charge transfer units, in the horizontal direction;

an output unit for converting the electrical charges transferred from said horizontal charge transfer unit into an image signal and outputting the image signal, wherein

said color filter array comprises an array, in the vertical direction, of a plurality of units of color filter groups, with each unit comprised of 8 rows in which an

odd-numbered row includes an alternate array of a first color filter and a second color filter in a predetermined order while an even-numbered row includes an alternate array of a third color filter and a fourth color filter in a predetermined order, and

an image signal corresponding to one row, within an image signal obtained from the image pickup element in a single image pickup operation, is outputted as a line-sequential color difference signal of pixels of 4 rows in the vertical direction, wherein:

a color filter at a $(4n+1)$ th row and an odd-numbered column is same as a color filter at a $(4n+3)$ th row and an even-numbered column,

a color filter at a $(4n+2)$ th row and an odd-numbered column is same as a color filter at a $(4n+4)$ th row and an even-numbered column,

a color filter at a $(4n+1)$ th row and an even-numbered column is same as a color filter at a $(4n+3)$ th row and an odd-numbered column,

a color filter at a $(4n+2)$ th row and an even-numbered column is same as a color filter at a $(4n+4)$ th row and an odd-numbered column, and

n is an integer equal to or larger than 0.

5. (Previously presented): An image pickup device according to claim 3, wherein signal charges of two predetermined pixels that are mutually adjacent in the vertical direction, among the plurality of pixels arranged corresponding to the color filters, are added and an image signal corresponding to the added signal charges is outputted from said output unit.

6. (Previously presented): An image pickup device according to claim 4, wherein signal charges of two predetermined pixels that are mutually adjacent in

the vertical direction, among said plurality of pixels corresponding to the color filters, are added and an image signal corresponding to the added signal charges is outputted from said output unit.

7. (Previously presented): An image pickup device according to claim 5, wherein

the added signal charges of the two predetermined pixels are further added with signal charges of two predetermined pixels that are present in a direction diagonal to the first-mentioned two predetermined pixels in a column adjacent to that of the first-mentioned two predetermined pixels, and

an image signal corresponding to the added signal charges of the four predetermined pixels is outputted from said output unit.

8. (Previously presented): An image pickup device according to claim 6, wherein

the added signal charges of the two predetermined pixels are further added with signal charges of two predetermined pixels that are present in a direction diagonal to the first-mentioned two predetermined pixels in a column adjacent to that of the first-mentioned two predetermined pixels, and


an image signal corresponding to the added signal charges of the four predetermined pixels is outputted from said output unit.

9. (Previously presented): An image pickup device according to claim 7, wherein an image signal corresponding to signal charges is outputted from said output unit by combining a method of adding the signal charges in the vertical direction and in the

diagonal direction and a method of further adding, to the signal charges added in the vertical direction, signal charges in the vertical direction.

10. (Previously presented): An image pickup device according to claim 8, wherein an image signal corresponding to the signal charges is outputted from said output unit by combining a method of adding signal charges in the vertical direction and in the diagonal direction and a method of further adding, to the signal charges added in the vertical direction, signal charges in the vertical direction.

11 and 12. (Canceled)

 13. (Previously presented): An image pickup device according to claim 5, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

14. (Previously presented): An image pickup device according to claim 6, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

15. (Previously presented): An image pickup device according to claim 7, wherein the color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

16. (Previously presented): An image pickup device according to claim 8, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

17. (Previously presented): An image pickup device according to claim 9, wherein the color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

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18. (Previously presented): An image pickup device according to claim 10, wherein color filters corresponding to the two predetermined pixels are a combination of cyan and green and a combination of yellow and magenta, or a combination of yellow and green and a combination of cyan and magenta.

19. (Previously presented): An image pickup device according to claim 3, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the pixels to said plurality of vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

20. (Previously presented): An image pickup device according to claim 4, wherein the image pickup element comprises a plurality of electrodes, each of

which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

21. (Previously presented): An image pickup device according to claim 5, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

22. (Previously presented): An image pickup device according to claim 6, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

23. (Previously presented): An image pickup device according to claim 7, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

24. (Previously presented): An image pickup device according to claim 8, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

25. (Previously presented): An image pickup device according to claim 9, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

26. (Previously presented): An image pickup device according to claim 10, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

27 and 28. (Canceled)

29. (Previously presented): An image pickup device according to claim

13, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

30. (Previously presented): An image pickup device according to claim 14, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

31. (Previously presented): An image pickup device according to claim 15, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

32. (Previously presented): An image pickup device according to claim 16, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge

transfer units to said horizontal charge transfer unit.

33. (Previously presented): An image pickup device according to claim 17, further comprising a plurality of electrodes each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from the plurality of pixels to said vertical read-out units and to control transfer of the signal charges from said vertical read-out units to said horizontal read-out unit.

34. (Previously presented): An image pickup device according to claim 18, wherein the image pickup element comprises a plurality of electrodes, each of which is connected commonly to every fourth pixel in the vertical direction, and which are adapted to control read-out of signal charges from said pixels to said vertical charge transfer units and to control transfer of the signal charges from said vertical charge transfer units to said horizontal charge transfer unit.

Canceled

35. (Canceled)

36. (Previously presented): An image pickup device according to Claim 3, further comprising:

a signal processing unit, which subjects the signals outputted from said output unit to an image processing; and

an image display unit, which displays image information from said signal processing unit.